

What Is Claimed Is:

- 1 An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:
 - 5 (a) the nucleotide sequence shown in SEQ ID NO:1, or the complement thereof;
 - (b) a nucleotide sequence that hybridizes to said nucleotide sequence of (a) under a wash stringency equivalent to 0.5X SSC to 2X SSC, 0.1% SDS, at 55-65°C, and which encodes a polypeptide having enzymatic activity similar to that of *Arabidopsis thaliana* plastid pyruvate dehydrogenase complex E1 α subunit;
 - 15 (c) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (a), but which is degenerate in accordance with the degeneracy of the genetic code; and
 - (d) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.
2. A recombinant vector, comprising said isolated DNA molecule of claim 1.
3. A host cell transformed with said recombinant vector of claim 2.
4. An isolated polypeptide having the amino acid sequence of SEQ ID NO.:2.
5. An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:

- (a) the nucleotide sequence shown in SEQ ID NO:3, or the complement thereof;
- (b) a nucleotide sequence that hybridizes to said nucleotide sequence of (a) under a wash stringency equivalent to 0.5X SSC to 2X SSC, 0.1% SDS, at 55-65°C, and which encodes a polypeptide having enzymatic activity similar to that of *Arabidopsis thaliana* plastid pyruvate dehydrogenase complex E1β subunit;
- (c) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (a), but which is degenerate in accordance with the degeneracy of the genetic code; and
- (d) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.

6. A recombinant vector, comprising said isolated DNA molecule of claim 5.

7. A host cell transformed with said recombinant vector of claim 6.

8. An isolated polypeptide having the amino acid sequence of SEQ ID NO.:4.

9. An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:

- (a) the nucleotide sequence shown in SEQ ID NO:5, or the complement thereof;
- (b) a nucleotide sequence that hybridizes to said nucleotide sequence of (a) under a wash stringency equivalent to 0.5X SSC to 2X SSC, 0.1% SDS, at 55-65°C, and which encodes a polypeptide

10 having enzymatic activity similar to that of *Arabidopsis thaliana* plastid pyruvate dehydrogenase complex E2 component;

15 (c) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (a), but which is degenerate in accordance with the degeneracy of the genetic code; and

(d) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.

10. A recombinant vector, comprising said isolated DNA molecule of claim 9.

11. A host cell transformed with said recombinant vector of claim 10.

12. An isolated polypeptide having the amino acid sequence of SEQ ID NO.:6.

13. An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:

5 (a) the nucleotide sequence shown in SEQ ID NO:11, or the complement thereof;

(b) a nucleotide sequence that hybridizes to said nucleotide sequence of (a) under a wash stringency equivalent to 0.5X SSC to 2X SSC, 0.1% SDS, at 55-65°C, and which encodes a polypeptide 10 having enzymatic activity similar to that of *Arabidopsis thaliana* branched chain 2-oxoacid dehydrogenase complex E1 α subunit;

(c) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of

15 (a), but which is degenerate in accordance with the degeneracy of the genetic code; and

(d) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.

14. A recombinant vector, comprising said isolated DNA molecule of claim 13.

15. A host cell transformed with said recombinant vector of claim 14.

16. An isolated polypeptide having the amino acid sequence of SEQ ID NO.:12.

17. An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:

5 (a) the nucleotide sequence shown in SEQ ID NO:13, or the complement thereof;

(b) a nucleotide sequence that hybridizes to said nucleotide sequence of (a) under a wash stringency equivalent to 0.5X SSC to 2X SSC, 0.1% SDS, at 55-65°C, and which encodes a polypeptide 10 having enzymatic activity similar to that of *Arabidopsis thaliana* branched chain 2-oxoacid dehydrogenase complex E1 β subunit;

15 (c) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (a), but which is degenerate in accordance with the degeneracy of the genetic code; and

(d) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.

18. A recombinant vector, comprising said isolated DNA molecule of claim 17.

19. A host cell transformed with said recombinant vector of claim 18.

20. An isolated polypeptide having the amino acid sequence of SEQ ID NO.:14.

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A47* 21. The isolated DNA molecule of claim 17, wherein the naturally occurring branched chain oxoacid dehydrogenase complex E2 component binding region thereof is replaced with the E2 component binding region of a plastid pyruvate dehydrogenase complex E1 β subunit.

22. The isolated DNA molecule of claim 21, wherein said plastid pyruvate dehydrogenase complex E1 β subunit has the sequence shown in SEQ ID NO.:3.

23. A recombinant vector, comprising said isolated DNA molecule of claim 22.

24. A host cell transformed with said recombinant vector of claim 23.

25. An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:

5 (a) the nucleotide sequence shown in SEQ ID NO:15, or the complement thereof;

(b) a nucleotide sequence that hybridizes to said nucleotide sequence of (a) under a wash stringency equivalent to 0.5X SSC to 2X SSC, 0.1% SDS, at 55-65°C, and which encodes a polypeptide 10 having enzymatic activity similar to that of

Arabidopsis thaliana branched chain 2-oxoacid dehydrogenase complex E2 component;

15 (c) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (a), but which is degenerate in accordance with the degeneracy of the genetic code; and

(d) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.

26. A recombinant vector, comprising said isolated DNA molecule of claim 25.

27. A host cell transformed with said recombinant vector of claim 26.

28. An isolated polypeptide having the amino acid sequence of SEQ ID NO.:16.

29. A plant, a plastid of which comprises the following polypeptides:

an enzyme that enhances the biosynthesis of 2-oxobutyrate;

5 a branched chain oxoacid dehydrogenase complex E1 α subunit;

a branched chain oxoacid dehydrogenase complex E1 β subunit; and

a branched chain oxoacid dehydrogenase complex E2 component.

30. The plant of claim 29, wherein said branched chain oxoacid dehydrogenase complex E1 α subunit has the sequence shown in SEQ ID NO.:12, said branched chain oxoacid dehydrogenase complex E1 β subunit has the sequence shown in SEQ ID NO.:14, or

said branched chain oxoacid dehydrogenase complex E2 component has the sequence shown in SEQ ID NO.:16.

31. The plant of claim 29, wherein said plastid further comprises the following polypeptides:

- a β -ketothiolase;
a β -ketoacyl-CoA reductase; and
5 a polyhydroxyalkanoate synthase.

32. The plant of claim 31, the genome of which comprises introduced DNAs encoding said polypeptides, wherein each of said introduced DNAs is operatively linked to a targeting peptide coding region capable 5 of directing transport of said polypeptide encoded thereby into a plastid.

33. A method of producing P(3HB-co-3HV) copolymer, comprising growing said plant of claim 32, and recovering P(3HB-co-3HV) copolymer produced thereby.

34. A plant, a plastid of which comprises the following polypeptides:

- an enzyme that enhances the biosynthesis of 2-oxobutyrate;
5 a branched chain oxoacid dehydrogenase complex E1 α subunit;
a branched chain oxoacid dehydrogenase complex E1 β subunit;
10 a branched chain oxoacid dehydrogenase complex E2 component; and
a dihydrolipoamide dehydrogenase E3 component.

35. The plant of claim 34, wherein said branched chain oxoacid dehydrogenase complex E1 α

subunit has the sequence shown in SEQ ID NO.:12, said branched chain oxoacid dehydrogenase complex E1 β

5 subunit has the sequence shown in SEQ ID NO.:14, or said branched chain oxoacid dehydrogenase complex E2 component has the sequence shown in SEQ ID NO.:16.

36. The plant of claim 34, wherein said plastid further comprises the following polypeptides:

a β -ketothiolase;

a β -ketoacyl-CoA reductase; and

5 a polyhydroxyalkanoate synthase.

37. The plant of claim 36, the genome of which comprises introduced DNAs encoding said polypeptides, wherein each of said introduced DNAs is operatively linked to a targeting peptide coding region capable of directing transport of said polypeptide encoded thereby into a plastid.

38. A method of producing P(3HB-co-3HV) copolymer, comprising growing said plant of claim 37 and recovering P(3HB-co-3HV) copolymer produced thereby.

39. A plant, a plastid of which comprises the following polypeptides:

an enzyme that enhances the biosynthesis of 2-oxobutyrate;

5 a branched chain oxoacid dehydrogenase complex E1 α subunit; and

a branched chain oxoacid dehydrogenase complex E1 β subunit, the naturally occurring E2 binding region of which is replaced with the E2 binding 10 region of a plastid pyruvate dehydrogenase complex E1 β subunit.

40. The plant of claim 39, wherein said branched chain oxoacid dehydrogenase complex E1 α subunit has the sequence shown in SEQ ID NO.:12.

41. The plant of claim 39, wherein said plastid further comprises the following polypeptides:

- a β -ketothiolase;
- a β -ketoacyl-CoA reductase; and
- 5 a polyhydroxyalkanoate synthase.

42. The plant of claim 41, the genome of which comprises introduced DNAs encoding said polypeptides, wherein each of said introduced DNAs is operatively linked to a targeting peptide coding region capable 5 of directing transport of said polypeptide encoded thereby into a plastid.

43. A method of producing P(3HB-co-3HV) copolymer, comprising growing said plant of claim 42 and recovering P(3HB-co-3HV) copolymer produced thereby.

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